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*Published in:*  
British HCI 2015

*DOI:*  
[10.1145/2783446.2783567](https://doi.org/10.1145/2783446.2783567)

*Publication date:*  
2015

*Document Version*  
Peer reviewed version

[Link to publication in Discovery Research Portal](#)

*Citation for published version (APA):*

Do, T. V., Cheverst, K., & Taylor, N. (2015). Content analysis of a rural community's interaction with its cultural heritage through a longitudinal display deployment. In *British HCI 2015: Proceedings of the 2015 British HCI Conference 2015* (pp. 46-55). Association for Computing Machinery. <https://doi.org/10.1145/2783446.2783567>

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# Content Analysis of a Rural Community's Interaction with its Cultural Heritage through a Longitudinal Display Deployment

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## ABSTRACT

In this paper we present content analysis related to our longitudinal deployment of the Wray Photo Display within a rural village community. The situated display based system enables village residents to upload images (typically photos) relating to their community for viewing by fellow residents and visitors to the village. Residents can also provide a response to pictures via the system's commenting feature. A content analysis has revealed that the majority of images uploaded to the system relate to the cultural heritage of the village (across both 'past' and 'contemporary' categories). Furthermore, analysis of the comments relating to these images reveals a wide range of use, including: clarification (e.g. the subject of the photo or the period when it was taken), identification (e.g. identification of relatives in the photo) and narratives (e.g. "...my mum & dad rented from Mr Phillipson who lived next door...").

## Categories and Subject Descriptors

**Communications Applications; User Interfaces ~ User centered design; Group and Organization Interfaces ~ Theory and Models; Social and behavioral sciences ~ Sociology**

## Keywords

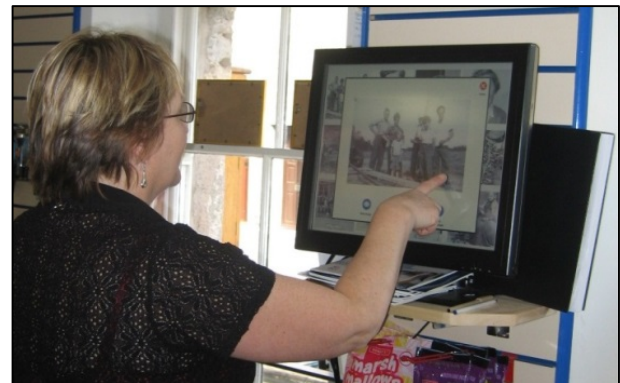
Community interaction, public displays, pervasive displays, community needs, cultural heritage, grounded analysis, community generated content.

## 1. INTRODUCTION

In this paper we present our longitudinal study of a community photo display system known as the Wray Photo Display [28][29] and how members of the community used this display to interact with their past (and each other). Our development of the Wray Photo Display commenced in 2006 as part of an action research project which set out to investigate how situated displays could support rural communities, and in particular how such displays

could support coordination and notions of community such as a shared history and identity.

The Wray display (see Figure 1 below) was co-designed with the residents of the village of Wray. Wray is a rural village in the north of England with a population of approximately 500 people. In carrying out our research, we have made significant use of technology probes [17] and the use of longitudinal studies 'in the wild' [24]. Indeed our situated display based application was designed as a technology probe and has undergone a number of revisions since its initial deployment in 2006. These revisions were made in order to satisfy requests for additional functionality received from the village community as part of a participatory design process. In particular, in 2010, a significant design modification saw the Photo display functionality supplemented with additional functionality to allow residents to post advertisements and event listings and from this point the display system was renamed to WrayDisplay [29].



**Figure 1. The Wray Photo Display in the village Post Office. The figure shows one of Wray's residents interacting with a historical photo.**

A local technology enthusiast agreed to act as a 'champion' in the community and work with us to deploy technologies and organise meetings with other residents. The significance of having such a person available to help the research team and support the sustainability of the project over a longitudinal period cannot be overstated.

Beyond an early collection of seeded photos, the content of the display was entirely determined by the residents of the village. One early and key design decision was to enable village residents to create and take ownership of their own content categories, including delegated moderation. The importance of fostering this

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*British HCI 2015*, July 13 - 17, 2015, Lincoln, United Kingdom.

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DOI: <http://dx.doi.org/10.1145/2783446.2783567>

sense of ownership in order to nurture a long-term community engagement is stressed by [2]: “A sense of ownership can be facilitated in projects that are research—rather than community-led by following an action research approach that aims to involve the community in the conception and running of the project”.

Our work in Wray has followed a general action research approach while also making strong efforts to embrace participatory design. A discussion/comparison of AR and PD is presented by [12].

The Wray Photo Display is, of course, not the first example of a technology focused community system supporting cultural heritage. Much of the earliest work investigating local intranets or “community networks” found that such tools supported the recording of history in a community. To take a well-known example, studies of the Blacksburg Electronic Village [6] saw various groups within the community maintaining pages which celebrated the town’s history, including input from local schoolchildren. However, community-centric situated display deployments have typically concentrated on awareness of current events and individuals in the community rather than the past. One important property of a situated display based system is that the display(s) can be placed at key locations in the community (and by the community) and these placements will typically have certain expected audiences. For example, the Wray Photo display is currently deployed at the village Post Office and a local pub (previously displays have been deployed in the village hall and a café) and these are all places in the village that are frequented by both residents and visitors, e.g. families on holiday.

Since the first deployment of a display in the village in 2006, in excess of 2,650 photos have been submitted to the system (as of March 2015). A current focus of our research is to provide residents with sophisticated tools (including mobile tools) to support the shared collection and curation of narratives relating to the local history and cultural heritage of Wray. Indeed, a key motivating factor for carrying out the content analysis detailed in this article has been to inform the design of the aforementioned tools.

The remainder of this article is structured as follows. In the next section we present background to the research and related work around the areas of ‘sense of community’ (and how this relates to a community’s shared sense of history) and situated displays/locative media applications that have been built to support exploration of cultural heritage materials. In Section 3 we present an overview of the design, deployment and use of the Wray Photo Display with particular emphasis on those issues relating to Wray’s Cultural Heritage and associated user interaction. Following this, in section 4, we present our grounded analysis of content submitted to the system (both photos and associated comments) that relate to Wray’s cultural heritage. A discussion is presented in section 5. Finally, section 6 presents our summary and concluding remarks.

## 2. BACKGROUND AND RELATED WORK

Two areas of related work are applicable to the research presented in this article. These are ‘sense of community’ (and its relationship to shared Cultural Heritage) and technology based solutions (and in particular situated display and mobile technologies) that support the capture and sharing of Cultural Heritage materials.

### 2.1 Sense of Community and Cultural Heritage

McMillan and Chavis [21] define sense of community as “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together”. Further to this they highlight four key elements, namely: ‘membership’, ‘influence’, ‘integration and fulfilment of needs’ and ‘shared emotional connection’. It is this last element that is of particular relevance to this proposal and which McMillan and Chavis describe as:

*“the commitment and belief that members have shared and will share history, common places, time together and similar experiences. This is the feeling one sees in farmers’ faces as they talk about their home place, their land, and their families...”*

This shared heritage is very much socially produced [14] and maintaining these shared values is an active process: communities take “ownership of what is valuable to them” [7]. As discussed later in this paper, it is content relating to this shared history that has had such a strong connection with the Wray community.

Cultural Heritage is a broad concept. UNESCO notes that the term “Cultural Heritage” has not always meant the same thing. It has been undergoing a profound change [9]. This research is primary informed by the following definition:

*“Cultural Heritage is an expression of the ways of living developed by a community and passed on from generation to generation, including customs, practices, places, objects, artistic expressions and values. Cultural Heritage is often expressed as either Intangible or Tangible Cultural Heritage”* [18]

Based on the above definition and in collaboration with the Champion from Wray, we classified whether a photo submitted to the Photo Display system belongs to the village’s Cultural Heritage or not (see Section 4 for more details).

### 2.2 Situated Displays, Locative Media and Community

Research into ‘situated displays’ belongs in CSCW, Ubiquitous Computing and HCI fields and has received considerable interest in recent years due, in part, to the widespread availability of cheap display devices and wireless communications. An excellent foundational text for the topic area is: ‘Public and Situated Displays: Social and Interactional Aspects of Shared Display Technologies’ [22].

Fundamental to this notion of ‘situated’ is the notion of ‘place’ which Harrison and Dourish (1996) define as “a space which is invested with understandings of behavioural appropriateness, cultural expectations, and so forth”. Within the village of Wray, the situated nature of our display deployments was crucial with all deployments placed at community hubs, e.g. the Post Office, the village hall, the pub, etc.

In terms of previous research in this particular area one early example is that of the Campiello system [1], which was designed to support the place based community in a neighbourhood in Venice. More specifically the research aim was:

*“...supporting the dynamical exchange of information and experiences between the Community of People living in*

*Historical Cities of Arts and Culture, their local cultural resources, and foreign visitors”.*

In addition to supporting web-based access, members of the community could also interact with the system through a large screen display, referred to as the CommunityWall. Other work with public displays of user generated content has included interactive exhibits around significant local events [3], and aimed at fostering discussion and understanding around contentious aspects of local history [27].

Our focus on Locative Media [13][16] is strongly informed by the following statement from Willis and Cheverst [31]:

*“The development of locative media applications is not simply about the physical location or social setting in which the interaction occurs, but rather about situating the media within the social setting of a community”.*

Although predating the term, the research that took place in the late nineties on mobile context-aware city guides provided early examples of locative media systems. For example, the GUIDE system (Davies et al., 1998) was designed to provide visitors to the city of Lancaster and local residents with context-aware access to services and digital (hypermedia) content. The content was ostensibly related to the cultural heritage of Lancaster and included historical information relating to attractions within the city, e.g. Lancaster Castle.

Another early example of Locative Media (again one that existed before the term had actually been coined) was the project ‘34 North 118 West’ (<http://34n118w.net/>). This project from 2002 again coupled location sensing (GPS in this case) with mobile computing devices in order to support a ‘locative narrative’ in which users would be pushed audio narratives relating to places (and their associated history) they passed by in Los Angeles. At a similar time, the ‘Urban Tapestries’ project ([urbantapestries.net](http://urbantapestries.net)) set out to explore how “...by combining mobile and internet technologies with geographic information systems, people could ‘author’ the environment around them”. The project ended in 2004 and was then followed by the ‘social tapestries’ project ([socialtapestries.net](http://socialtapestries.net)) which focused on “exploring the potential benefits and costs of local knowledge mapping and sharing, what we have termed the public authoring of social knowledge. While few research publications relating to the project exist, a comprehensive report is available from the project web-site.

More recently, a myriad of context-aware/locative media mobile applications have arisen from both the research and commercial domains – the latter being to cater for the burgeoning smart-phone market. One important feature of these smart-phone applications is their ability to support the automatic tagging of photos with their location before being uploaded to social media sites such as flickr. There is then the potential to use the tagged content as feed for community displays, an approach adopted by the Citywall project [23] in Helsinki.

Supporting personalised access to Cultural Heritage is one growing area of research that focuses on personalisation aspects and appears to show significant future potential for benefiting the user experience. Two recent projects that represent current state of the art in this area are ‘Locast Tourism’ and ‘Memory Traces’ [5] which the authors describe as following “a systematised approach for designing online locative platforms in support of unique user experiences with situated sociocultural topics.” A comprehensive overview of research concerned with ICT support for content

organization and dissemination in cultural environments is presented by Styliaras et al [26].

### 3. DEVELOPMENT OF THE PHOTO DISPLAY

In this section we describe the on-going development of the Wray Photo Display.

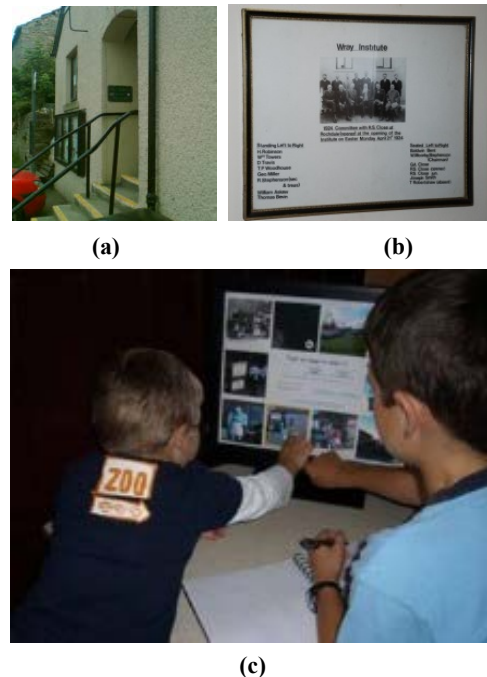
#### 3.1 Early Participatory Design Workshops

From the very beginning, the potential role of cultural heritage in a display of photos became apparent. Both the pub and village hall where early workshops were held had a number of framed photos on the wall showing Wray from the past (see Figure 1). Researchers drew on these photos to illustrate how photos (in this case historical and clearly related to the cultural heritage of Wray) might support the village’s community.

A decision was then made for the researchers to go ahead with the development of a simple system that would be placed inside the village hall (see Figure 1) and would display photos from the forthcoming scarecrow festival (an annual community event in which residents would build ornate scarecrows which would be placed in their gardens for public viewing during the so-called scarecrow festival week).

#### 3.2 The first Deployment of the Photo Display

The first display (see Figure 2c) was an extremely simple prototype: a touchscreen display connected to a concealed computer which showed pages of ten thumbnail photos, with on-screen controls to move back and forward through the photo. Photos could be transferred to and from the display using Bluetooth file transfers from mobile phones. In terms of hardware, the display application was driven by a Mac Mini which was selected due to its near-silent operation and small form factor (that allowed it to be placed out of view) and the display itself was a resistive touch screen monitor.



**Figure 2. a) Wray Village Hall, b) Historical photos on display in the Wray village Hall, and, c) Deployment of the first display prototype in the Wray Village Hall.**



The first version of the Photo Display was deployed during an annual event known as the produce show (which takes place a few weeks after the scarecrow festival) and this took place in the village Hall (Figure 2a). A comments book was placed next to the display and early hand-written comments left by residents and visitors to the village pointed to the desire for old photos to be included as future content. For example, the first comment left in the comments book (August 2006) was:

*"This is a very good idea. Very interesting for the village people. It would also be good to see some of the old photos of days gone by".*

And other similar early comments included:

*"Photo Album – wonderful idea. Would be great to see some of the historical pictures of the village..."*

When we later added the ability to add new categories it was agreed that, in order to foster a sense of ownership by the community for the system and its content, any member of the village would be able to add a category but that person would then have to pre-moderate any content before it would appear on the display. In addition to supporting additional photo categories, a web application for uploading and downloading photos from the display was also added.

### 3.3 Photo Categories

The first user-generated category to be created was "Old Photos" (examples shown in Figure 3). Comments received in the comments book shortly after the introduction of the new category were positive:

*"a great way of recording a living history of Wray"*

*"Love the different Categories. The old photos are fascinating"*

*"and a delight for those who were born here and to go down memory lane"*

These early comments signified at an early stage the importance that cultural heritage was going to play in the project.



Figure 3. Sample images included in the "Old Photos" category.



Figure 4. Two sample images included in the "Wray Flood" category.

Shortly after the addition of the "Old Photos" category (which typically contained photos of Wray from 20<sup>th</sup> Century) a new category was added called "Wray Flood". The Wray flood occurred in 1967 and the first images to be uploaded to this

category were clearly scans of newspaper pictures (see Figure 4). Later photos added to the "Old Photos" category were more varied, with photos from the past twenty years included. For example, one of the subcategories of the "Old Photos" category is "MilleniumCobble" (created in December 2010). Photos from this subcategory capture the implementation of a commemorative mosaic in the Flood garden in 2000. Figure 5 shows two of these photos.



Figure 5. Two sample images included in the "milleniumcobble" category.

### 3.4 Support for User Comments

One early hand-written comment left in the comments book motivated the addition of a commenting feature to the Photo Display application. This comment was left by a member of the Wray historical trust and read:

*"We have some names and descriptions of the photos (old ones) of wray and dates – How and When ??? could we put them on ?"*

We implemented the commenting feature using a reasonably straightforward on-screen keyboard. Figure 6 shows the display after it was moved from the village hall to the local Post Office with one of the younger village residents making use of the system's commenting feature.



Figure 6. A young resident entering a comment using the on-screen keyboard.

The new Post Office location also allowed the research team to receive feedback of use from the shop owner who could observe users of the display. The shop owner informed us that some visitors would spend 20 minutes or longer interacting with the display.

### 3.5 Display of Photos and Comments

When uploading a photo the user has a choice of whether or not to include a caption. Typically a caption was not included (see 4.2.2.3) but where a caption was included this would often provide interesting context. For example, in Figure 7a below there is a photo relating to contemporary cultural heritage that shows one of the town's scarecrows from the year 2000 and the user who submitted this photo included the caption:

*“2000 - no scarecrows 2001 due to foot & mouth outbreak”*

This caption refers to the fact that in 2001 there was no scarecrow festival in the following year because of enforced restrictions during the outbreak of the highly infectious ‘foot and mouth’ disease (*Aphthae epizooticae*) which had a devastating effect on rural farming communities (such as Wray) during the turn of the millennium. One user has responded to this with a poignant comment: “Sad”.



(a)



(b)

**Figure 7. Two screen shots showing: (a) an image from the “Scarecrows” category with a caption, and (b) an sample images included in the “Wray Flood” category.**

One example of an early photo submitted to the “Wray Flood” category which has with no caption but two associated user comments is shown in Figure 7b. The two comments are:

*“8th May 2008 at 10:32pm Gill Meadowcroft wrote: I lived in the house with the yellow looking door & window lintels, my Mum & Dad rented from Mr Phillipson who lived next door (with the porch) 1968-1974. The house next door this way was a garage with my bedroom above and Betty & Cyril Rhodes lived in the house nearest the edge of the picture. Gill Lane (Meadowcroft)”*,

and,

*“28th December 2007 at 4:02pm someone using the post Office display wrote: the one at the end of the street was our grandparents house!”*

Our coding of the comments submitted by members of the community in response to viewed photos is detailed in section 4.2.2.2.

### 3.6 Recent Developments and Current State

A second display was deployed in the village tea rooms (following a request in the comments book) and later functionality included a news and events features. More recently the photo display was moved from the village tea rooms to the pub. Where the tea rooms were largely used by visitors to the village, the pub was a social hub for residents of the village (and its walls were already decorated with historical photos of the village).

With the display in place, it continued to act as a probe to learn about the community and villagers’ use of the display, collecting community-generated content and logging all interaction. This allowed us to identify types of content that were popular in the village and approximate patterns of usage. To gain a deeper understanding beyond this data, we continued to meet with residents at regular intervals to discuss their thoughts about the display, how it was being used and how they would like to see it improved. We also regularly attended community events, such as the annual village fair.

Between 2006 and 2009, the photo collection continued to grow to encompass approximately 1,500 images covering all aspects of village life. In addition to the historical photos that had been prevalent at the beginning of the deployment, residents also uploaded hundreds of contemporary photos of the village, typically showing significant community-centered events. These included annual events, including photos of every scarecrow displayed in the village, and irregular events, such as day trips, snow storms and weddings. After the addition of commenting features, this was often used to post additional information about the photos, particularly identifying the people pictured. Our logs over this period showed approximately 3,300 sessions of interaction with the display and almost 14,000 individual photo views, demonstrating steady levels of use across the entire length of the study. At the time of writing (February 2015) the system supports 27 photo categories and 2,639 photos.

We are currently investigating the design of tools that will enable residents to create locative media experiences that utilise both new content and the existing content of the Wray Photo Display system.

## 4. ANALYSIS OF CONTENT RELATING TO CULTURAL HERITAGE

In this section, we describe our analysis of the 2,639 photos that have been submitted to the system by members of the community at the time of writing (February 2015). First we examined which of those photos are related to Cultural Heritage. Then we present the results of our grounded analysis of the comments and captions associated with the photos that were categorised as relating to Wray’s Cultural Heritage.

### 4.1 Approach

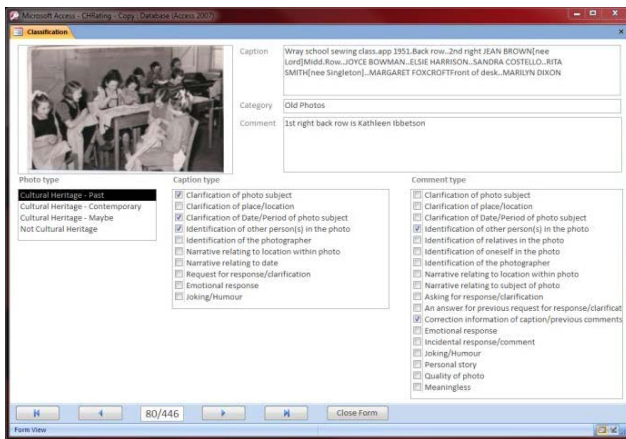
Our approach aligns with the guidelines from grounded theory [25]. The content analysis method [4][19][30][20] from qualitative research was employed to analyse photos and their comments and captions. This analysis involved two steps. The

first step involved collaborative sessions by two of the authors to code photos, comments, and captions. Following this, the second step was to validate our coding by asking the champion to code a sample of the content.

#### 4.1.1 First step: a priori and emergent coding of photos, captions and comments

Our first task was to decide whether a photo belongs to Cultural Heritage and code photos accordingly. As stated in Section 2.1, we take a broad view of Cultural Heritage when classifying photos submitted to the Wray Photo Display. Consequently, in addition to historical content (in categories such as “Old Photos” and “Wray Flood”) the Photo Display has also amassed a large number of photos of contemporary Cultural Heritage. While the historical photos are, perhaps, a more obvious representation of the community’s heritage, these contemporary photos (e.g. the photos in the “MilleniumCobble” category in Figure 5) clearly expresses a way of living developed by the Wray community in the form of an artistic expression that will be seen by future generations.

The *a priori coding* approach (Weber, 1990) was used for this task. In collaboration with our Champion from the village, we agreed to classify photos relating to the village’s Cultural Heritage into two groups: “Past” with photos dating back beyond 50 years and “Contemporary” with anything more recent. Consequently, submitted photos were classified into four categories: Cultural Heritage: Past, Cultural Heritage: Contemporary, Cultural Heritage: Uncertain and Not related to Cultural Heritage. In contrast, the *emergent coding* approach [15] was adopted to code comments and captions of photos. As a comment and caption may contain several sentences, they could be classified into more than one category. Whenever a caption/comment did not fit into existing categories, a new category was created. In fact, sometimes, existing categories were renamed to better distinguish them with a newly added category. Therefore, in the first session, all captions/comments were analysed to generate possible categories.



**Figure 8. The Microsoft Access application supporting coding process. A new category can be easily added “on-the-go” to lists of Caption type and Comment type.**

In the second session, similar categories were put together to form higher level categories (see Figure 9). Then we repeated the cycle of classifying captions and comments using the codes generated in the first session. To make the coding process simple, consistent, and accurate, we developed a Microsoft Access application (see Figure 8). Microsoft Access was selected because of two main

reasons: (1) its forms are bounded directly to data stored in tables, and (2) a new category can be easily added “on-the-go” to the user interface. *Data source triangulation* was also used to help ensure high-quality analysis [11], by checking the dates that some photos were taken with the members who posted them.

#### 4.1.2 Second step: Checking for stability and reproducibility

As recommended by Weber (1990), in order to make valid inferences from photos, comments, and captions, both stability (*intra-coder reliability*) and reproducibility (*inter-coder reliability*) checks are required. Regarding stability, the group members repeated the first step after two days. To check the reproducibility, another outside coder (the community Champion) was asked to independently code 100 random cases. These random cases had 100 comments associated to 56 individual photos and 18 captions. The same Microsoft Access application was sent to this coder with brief instructions. Typically, the outside coder must come up with her own categories. However, in our study, the outside coder was provided with all the identified categories. Of course, the outside coder was instructed to create new categories if she wished. Then the reliability was measured through the Cohen’s Kappa coefficient [8]. As some comments/captions covered different categories, if there was any overlap between two codings, they were considered as the same coding to calculate the Cohen’s Kappa coefficient.

## 4.2 Results

This section first presents results of the analysis of all 2,639 photos submitted to the system by members of the community. Then it describes in detail the analysis of photos with comments that were categorised as Wray’s Cultural Heritage.

#### 4.2.1 All photos

As of February 2015, 2639 photos (over 10 categories with 26 subcategories) have been uploaded to the Wray Display Photo. Photos were submitted either directly in the parent categories or subcategories. Many of the categories were created when the Photo Display was first deployed. However new subcategories are added more regularly to reflect events in the village. For example, each year a new subcategory is created in the ‘Scarecrows’ category to show photos of that year’s annual Scarecrow festival. Table 1 summarises categories, their created dates, and the number of photos in each category.

**Table 1. Summarisation of photos uploaded to the Wray Photo Display**

No.	Categories	Created date	No. of photos
1	Old Photos	30th Aug 2006	281
2	Funny Videos and Photos	14th Sep 2006	50
3	Wray Flood	28th Oct 2006	49
4	Current Photos	27th Oct 2006	467
5	Scarecrows	21st Aug 2006	1235
6	Village Events	8th Sep 2006	505
7	The Lake District	7th Mar 2010	8
8	Advertisements	11th Jun 2010	29
9	Classic Bike Night	9th Apr 2011	13
10	Arkholme	10th Feb 2013	2
Total			2639



These 2,639 photos were coded into the four categories of Cultural Heritage by two of the authors. Two days after the first coding, one of the authors repeated the coding. He made the same coding on 97% photos, indicating the high stability of coding. The results of the first coding were considered the final results (see Table 2). With 56 individual photos recoded by the outside coder, there was one case where a photo was initially classified into the Cultural Heritage: Uncertain category by the two authors but was subsequently placed into the Cultural Heritage: Contemporary by the outside coder. The Cohen's Kappa was 0.98, indicating satisfactory reliability (threshold = 0.6). One implication of our broad and inclusive scoping of Cultural Heritage in our coding is that only 2.5% of uploaded photo have been classified as not being related to the village's Cultural Heritage. Most of the photos belonging to this 2.5% are from the "Funny Video and Photos" category.

**Table 2. Classifying all uploaded photos into Cultural Heritage categories**

Cultural Heritage	No. of photos	% of each category/total submitted photos
Past	330	12.5%
Contemporary	2242	85.0%
Uncertain	9	0.3%
Not related	58	2.2%
Total	2639	100.0%

#### 4.2.2 Photos with comments

Of the 2639 photos submitted, there are 446 comments on 256 individual photos. The highest number of comments received by any individual photo was 23. This subset of 256 individual photos was again coded into the four categories shown in Table 3. We also analysed the comments and captions associated with the photos that were categorised as relating to Wray's Cultural Heritage. Our intention here was to understand how members of the Wray community interacted with and through the Cultural Heritage photos.

##### 4.2.2.1 Photos

Table 3 summarises the results of our classifying the 256 individual commented photos. Of 56 recoded photos, the outside coder agreed with the author on 98% of cases. The reliability was confirmed with the Cohen's Kappa of 0.98 (the same number in 4.2.1)

##### 4.2.2.2 Comments

About 72% (320/446) of all comments were associated with photos relating to Cultural Heritage (see Table 3). The content analysis on the comments forms a coding scheme as in Figure 9.

66 out of the 100 comments recoded by the outside coder were for photos relating to Cultural Heritage. As one comment could be classified into more than one category, there were some complete overlaps, partial overlaps, and no overlap between two codings.

**Table 3. Classifying commented photos into Cultural Heritage categories.**

Cultural Heritage	No. of photos	% each category/total commented photos	No. of comments	No. of comments per photo
Past	52	19.3%	86	1.7
Contemporary	157	50.7%	226	1.4
Uncertain	8	1.8%	8	1.0
Not related	39	28.2%	126	3.2
Total	256	100.0%	446	1.7

<b>A. Clarification</b>	<b>(91)</b>
A1. Clarification of photo subject	58
E.g. "View of wray from the hot air balloon"	
A2. Clarification of place/location	20
E.g. "That looks like the Hindburn where it joins the Roeburn"	
A3. Clarification of date/period of photo subject	13
E.g. "Miss Mashiter's before the flood"	
E.g. "Wiew of Wray from hot air balloon july2005"	
<b>B. Identification</b>	<b>(47)</b>
B1. Identification of oneself in the photo	1
E.g. "Omg what do I look like haha x x x"	
B2. Identification of relatives in the photo	5
E.g. "Wow a picture of Nana and Grandad I've never seen before!xx"	
B3. Identification of other person(s) in the photo	40
E.g. "Mr Evans and Miss Mashiter are the teachers in this photo"	
B4. Identification of the photographer	1
E.g. "Nice from ross louise lucas"	
<b>C. Narrative</b>	<b>(9)</b>
C1. Narrative relating to location within photo	6
E.g. "I lived in the house with the yellow looking door & window lintels, my Mum & Dad rented from Mr Phillipson who lived next door..."	
C2. Narrative relating to subject of photo	3
E.g. "Harrys horses the younger one now has leg trouble and may not come back to wray but that will not stop harrn"	
<b>D. Interactive Comments</b>	<b>(31)</b>
D1. Asking for response/clarification	17
E.g. "was this wat time? it doesnt look like the floods, did Wray get hit by a bomb?"	
D2. An answer for previous request for response/clarification	13
E.g. "Wasn't a bomb, that was the flood..."	
D3. Correction information of caption/previous comments	1
E.g. "the word above should be 'good' missed out the 'g'."	
<b>E. Personal Comments</b>	<b>(210)</b>
E1. Emotional response	26
E.g. "Joe you legend, always remembered never forgot!!"	
E2. Joking/Humour	87
E.g. "whoever made that must be well hot"	
E3. Incidental response/comment	92
E.g. "It is brilliant, it is amazing"	
E4. Personal story	5
E.g. "they were landlords when I used to go in, if fact they were landlords for all the years we spent at wray on holiday!"	
<b>F. Other</b>	<b>(15)</b>
F1. Quality of photo	7
E.g. "this picture is a very nice picture"	
F2. Meaningless	8
E.g. "Sr", "00_)"	

**Figure 9. The coding scheme developed for comments (numbers represent absolute occurrences of a given code from 320 comments).**

Table 4 compares the coding between the outside coder and the two authors. Treating any overlap between the two codings as the same coding, the Cohen's Kappa for comment coding was 0.95 which met the satisfactory threshold. Our discussion with the outside coder about different coded cases revealed that the main

reason for different coding was that the outside coder had more knowledge about submitted photos and comments. For example, a photo of more than 20 old people had a comment “That could be my nana”. The two authors thought that was a joke but the outside coder classified that comment as a personal story because she knew the people in the photo and the person who commented. She even created a new category called “Quality feedback” to mark which comments were correct about photos.

**Table 4. Comparison of the coding between the outside coder and the two authors**

	No. of codings	% of codings
Complete overlap	55	83%
Partial overlap	8	12%
No overlap	3	5%
Total	66	100%

#### 4.2.2.3 Captions

100 out of the subset of 256 individual photos had captions and 82 of them were associated with photos relating to Cultural Heritage. Another coding scheme was also developed for these captions (see Figure 10). Only 18 out of the 56 recoded photos had captions. The outside coder agreed with the two authors on 100% of caption coding (Cohen’s Kappa = 1.0).

<b>A. Clarification</b>	<b>(126)</b>
A1. Clarification of photo subject	66
E.g. “Wray Over 60s...Trip to Dumfries & Moffat. July 2007”	
A2. Clarification of place/location	31
E.g. “Bob Smith at the opening of The Inn at Wray. Feb 2008”	
A3. Clarification of date/period of photo subject	29
E.g. “After flood”	
<b>B. Identification</b>	<b>(31)</b>
B1. Identification of other person(s) in the photo	18
E.g. “Bob Smith at the opening of The Inn at Wray. Feb 2008”	
B2. Identification of the photographer	13
E.g. “Maggot Racing 2008 at the George and Dragon. Photographer Tony Quinn.”	
<b>C. Narrative</b>	<b>(7)</b>
C1. Narrative relating to location within photo	5
E.g. “Rita Smith on Roeburn Bridge before the flood. Notice low wall of the river”	
C2. Narrative relating to date	2
E.g. “2000 - no scarecrows in 2001 due to foot & mouth outbreak”	
<b>D. Request for response/clarification</b>	<b>(11)</b>
E.g. “Anyone know which year this was?”	
Leave comments if you know anybody on this photo...”	
<b>E. Personal caption</b>	<b>(5)</b>
E1. Emotional response	1
E.g. “What a sweetie, who is he?”	
E2. Joking/Humour	4
E.g. “How much is that Corgi in the window ... Woof Woof!”	
E.g. “Eat yer art out Jeremy, here is the stig... roeburndale”	

**Figure 10. The coding scheme developed for captions (numbers represent absolute occurrences of a given code from 82 captions).**

## 5. DISCUSSION

When the Photo Display was first deployed, we made no suggestions regarding appropriate content for the display other than uploading a number of our own photos of that year’s annual Scarecrow Festival to provide some initial content. At first, photos could only be uploaded to the display by a designated administrator using a private web application, but residents still requested specific content using a paper comments book left next to the display. As described in section 3.2, within days of the initial deployment, several residents requested that historical photos of the village community be posted on the display,

demonstrating a strong interest in “the way things were” and comments also suggested that the display could record a “living history” of the village.

Shortly afterwards, we expanded the web application to allow other members of the community to upload their own photos, and they did so enthusiastically. After a web application for uploading and downloading photos from the display was added, the collection of photos expanded rapidly. Most prominent amongst these were historical photos of Wray, covering a wide variety of time periods: the oldest photos dated from the early 20th Century, while others were only decades old. Many of these related to a flash flood that had swept through the village in 1967, destroying several buildings. Photos were uploaded depicting the damage wrought by the flood, as well as images of the village as it existed beforehand. These had previously existed only in private photo collections and were scanned for the explicit purpose of uploading them to the display, bringing these images to the public for the first time.

Although these photos could have easily been shared on any number of websites or paper displays prior to the display being deployed, the presence of a novel photo sharing device appeared to act as a catalyst that prompted residents to share their collections for the first time. The display was also a far more visible means of sharing these photos, and would see on a regular basis by both residents and visitors alike.

Despite the previous lack of online photo sharing in the community prior to the display’s deployment, this behaviour did emerge afterwards. The original prototype did not allow the content to be browsed online, which was subsequently requested by many residents. While this feature was in development, our champion added photo galleries to the village website to meet this demand.

The situated nature of the Photo display deployments has been crucial. Indeed a pivotal point was when the display was moved (by the residents rather than the researchers) from the village hall to the local village Post Office. The shop was visited frequently by a large proportion of the village residents and also visitors to the village, who would, for example, enter the shop to browse for a post-card. However, it was also a location where many members of the community met, discussed local issues and accessed information through noticeboards and conversation. This meant that the location was highly suitable for display deployments, and our own logs showed five times the level of interaction in the month following the move compared to the month before.

## 6. FUTURE WORK AND CONCLUSIONS

In this paper we have presented a content analysis of the photos and associated comments submitted by residents to the Wray Photo Display during its longitudinal deployment.

A significant proportion of the images uploaded to the system relate to the village’s Cultural Heritage (both past and contemporary). Furthermore, an analysis of the captions and comments (associated with the submitted photos relating to Cultural Heritage) has revealed important insights into the ways in which members of the village community respond to these images in this particular deployment context. For example, the largest category of comment identified was that of ‘Personal Comments’ including (not surprisingly) much use of humour. It was, however, also interesting to observe some of the other categories such as: ‘Clarification’, ‘Narrative’ and comments relating to ‘Personal

Stories' that illustrate how the village residents have made efforts to provide addition context and personal insight.

These findings have been key in prompting us to take the research forward by exploring ways in which residents can create locative media experiences, such that these and personal insights and narratives can be experiences in-situ by fellow residents and visitors. In order to support this we have developed the SHARC framework [10] which comprises a set of tools (such as a web-based authoring tool and an android based mobile app that supports the playing of locative media experiences). The web-based authoring tool enables residents to design walks around the village that utilise existing content from the system (as well as supporting the contribution of new content). For example, a resident may create or author a walk that starts at Wray Bridge and has as its main theme the Wray flood of 1967. As part of the authoring process, she may choose to select one or more of the 15 submitted photos showing this important landmark and include some of the existing narratives and stories relating to this.

A mobile app to allow residents and visitors to consume such experiences is currently being developed and undergoing initial evaluation. The content analysis presented in this paper demonstrates the enthusiasm of residents for adding their own personal insights etc. to media associated with the cultural heritage of their village. Given this enthusiasm we are designing the mobile app to have a response feature. This feature will enable the user to respond through the app while consuming a given locative media experience. Importantly, this response feature is being designed (at least initially) to enable the user to express their response in ways that reflect the comment categories presented in this paper.

## 7. ACKNOWLEDGMENTS

This work was carried out as part of the SHARC project (EPSRC Reference No.: EP/K015850/1).

## 8. REFERENCES

- [1] Agostini, A. and Valpiani, A. 1999. Appreciating cultural heritage by activating local communities. *Workshop on "Artificial Intelligence & Cultural Heritage" within AI\*IA99, 6th Conference of the Italian Association for Artificial Intelligence* (Bologna, Italy, September 14-17, 1999).
- [2] Balestrini, M. et al. 2014. Understanding sustained community engagement: a case study in heritage preservation in rural Argentina. *In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Toronto, Canada, April 26 - May 1, 2014), CHI '14. ACM, New York, NY, 2675–2684. DOI = <http://doi.acm.org/10.1145/2556288.2557323>.
- [3] Bartindale, T. et al. 2011. Bridging the gap: implementing interaction through multi-user design. *In Proceedings of the SIGCHI Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '11* (Vancouver, BC, Canada, May 7 - 12, 2011), CHI '11, ACM, New York, NY, 2071–2076. DOI = <http://doi.acm.org/10.1145/1979742.1979922>.
- [4] Berelson, B. 1952. *Content analysis in communication research*. Free Press.
- [5] Boghani, A. and Casalegno, F. 2012. Open Locast: Locative media platforms for situated personal experiences. *4th International workshop on personalised access to Cultural Heritage within the 20th conference on User Modeling, Adaptation, and Personalization* (Montreal, Canada, July 16-20, 2012).
- [6] Carroll, J.M. and Rosson, M.B. 1996. Developing the Blacksburg electronic village. *Communications of the ACM*. 39, 12 (Dec. 1996), 69–74.
- [7] Ciolfi, L. 2013. The collaborative work of heritage: open challenges for CSCW. *In Proceedings of European Conference on Computer-Supported Cooperative Work* (Raphos, Cyprus, September 21-25, 2013), ECSCW '13, Springer London, 83–101. DOI = <http://link.springer.com/10.1007/978-1-4471-5346-7>.
- [8] Cohen, J. 1960. A Coefficient of Agreement for Nominal Scales. *Educational and Psychological Measurement*. 20, 1 (Apr. 1960), 37–46.
- [9] Cultural Heritage: UNESCO Culture Sector: [http://portal.unesco.org/culture/en/ev.php-URL\\_ID=2185&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/culture/en/ev.php-URL_ID=2185&URL_DO=DO_TOPIC&URL_SECTION=201.html). Accessed: 2015-05-19.
- [10] Do, T. V. and Cheverst, K. 2015. The SHARC framework: Utilizing personal Dropbox accounts to provide a scalable solution to the storage and sharing of community generated locative media. *In Proceedings of the 7th ACM SIGCHI Symposium on Engineering Interactive Computing Systems* (Duisburg, Germany, June 23–26, 2015), ACM, New York, NY, USA. To appear.
- [11] Erlandson, D.A. et al. 1995. *Doing naturalistic inquiry: A Guide to Methods*. Sage.
- [12] Foth, M. and Axup, J. 2006. Participatory Design and Action Research: Identical Twins or Synergetic Pair? *In Proceedings of the 9th Conference on Participatory Design* (Trento, Italy August 1-5, 2006), PDC '06, ACM, New York, NY, USA.
- [13] Galloway, A. and Ward, M. 2006. Locative media as socialising and spatializing practice: Learning from archaeology. *Leonardo electronic almanac*. 14, 3 (2006).
- [14] Giaccardi, E. and Palen, L. 2008. The social production of heritage through cross-media interaction: Making place for place-making. *International Journal of Heritage Studies*. 14, 3 (May 2008), 281–297.
- [15] Haney, W. et al. 1997. Drawing on Education: Using Student Drawings To Promote Middle School Improvement. *Schools in the Middle*. 7, 3 (Dec. 1997), 38–43.
- [16] Hight, J. 2008. Directions in Locative Media. *IEEE Multimedia*. 15, 3 (Jul. 2008), 4–5.
- [17] Hutchinson, H. et al. 2003. Technology probes: inspiring design for and with families. *In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Florida, USA, April 5-10, 2003), CHI '03, ACM, New York, NY, USA, 17–24. DOI = <http://doi.acm.org/10.1145/642611.642616>.
- [18] ICOMOS International Committee on Cultural Tourism and International Council on Monuments and Sites. 2002. *ICOMOS International Cultural Tourism Charter: Principles and Guidelines for Managing Tourism at Places of Cultural and Heritage Significance*. International Council on Monuments and Sites, ICOMOS International Cultural Tourism Committee.

- [19] Krippendorff, K. 1980. *Content Analysis: An Introduction to Its Methodology*. SAGE.
- [20] Lazar, J. et al. 2010. *Research methods in human-computer interaction*. John Wiley & Sons.
- [21] McMillan, D.W. and Chavis, D.M. 1986. Sense of community: A definition and theory. *Journal of Community Psychology*. 14, 1 (Jan. 1986), 6–23.
- [22] O'Hara, K., Perry, M., Churchill, E. and Russell, D. 2003. *Public and situated displays: social and interactional aspects of shared display technologies*. Kluwer International.
- [23] Peltonen, P. et al. 2008. It's Mine, Don't Touch!: interactions at a large multi-touch display in a city centre. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Florence, Italy, April 5 - 10, 2008), CHI '08, ACM, New York, NY, 1285–1294. DOI = <http://doi.acm.org/10.1145/1357054.1357255>.
- [24] Rogers, Y. 2011. Interaction design gone wild: striving for wild theory. *Interactions*. 18, 4 (Jul. 2011), 58–62.
- [25] Strauss, A. and Corbin, J. 2008. Grounded theory methodology: an overview. *Strategies of qualitative inquiry*. N.K. Denzin and Y.S. Lincoln, eds. Sage Publications, Inc.
- [26] Styliaras, G. et al. 2010. *Handbook of Research on Technologies and Cultural Heritage: Applications and Environments*. IGI Global.
- [27] Taylor, N. 2014. Supporting community participation in interactive exhibits. In *Proceedings of The International Symposium on Pervasive Displays* (Copenhagen, Denmark, June 3 – 4, 2014), PerDis '14, ACM, New York, NY, USA, 74–79. DOI = <http://doi.acm.org/10.1145/2611009.2611031>.
- [28] Taylor, N. and Cheverst, K. 2009. Social interaction around a rural community photo display. *International Journal of Human-Computer Studies*. 67, 12 (Dec. 2009), 1037–1047.
- [29] Taylor, N. and Cheverst, K. 2012. Supporting Community Awareness with Interactive Displays. *Computer*. 45, 5 (May 2012), 26–32.
- [30] Weber, R. 1990. *Basic Content Analysis*. Sage Publications, Inc.
- [31] Willis, K.S. and Cheverst, K. 2011. Editorial: Special issue of international journal of human-computer studies locative media and communities. *International Journal of Human-Computer Studies*. 69, 10 (Sep. 2011), 615–617.